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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/600,888	08/15/2000	Kingo Suzuki	107242.00005	4637
4372	7590	10/16/2008		
ARENT FOX LLP 1050 CONNECTICUT AVENUE, N.W. SUITE 400 WASHINGTON, DC 20036				
EXAMINER				
TRINH, HOA B				
ART UNIT		PAPER NUMBER		
2893				
NOTIFICATION DATE		DELIVERY MODE		
10/16/2008		ELECTRONIC		

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

DCIPDocket@arentfox.com

IPMatters@arentfox.com

Patent\_Mail@arentfox.com

# Office Action Summary

**Application No.**

09/600,888

**Applicant(s)**

SUZUKI ET AL.

**Examiner**

HOA B. TRINH

**Art Unit**

2893

**Period for Reply** -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 19 June 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 7, 11 and 13 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 7, 11 and 13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 15 August 2000 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/C)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date \_\_\_\_\_

## **DETAILED ACTION**

### **Acknowledgement**

Applicant's amendment filed on 6/19/2008 has been considered and entered. Claims 7, 11, 13 are pending in the present application.

### ***Claim Objections***

1. Claim 7 is objected to because of the following informalities: In claim 7, lines 7-9, a phrase "the diameter is a length from a foot of one of the fine projections to a foot of next one of the fine projections" is vague. The examiner assumes in this Office Action that applicant has intended to recite the phrase to mean "the diameter is a length extending from a starting point of one of the fine projections to an ending point of the one of the fine projections". Appropriate correction is required.
2. Claim 11 is objected to because of the following informalities: In line 5 of the claim, "groups" should be "group". In lines 5-6, a phrase "a group consisting of Br<sub>2</sub>, nitric acid, hydrofluoric acid and acetic acid and I<sub>2</sub>, nitric acid, hydrofluoric acid, and acetic acid " is confusing because of the multiple "and". The examiner assumes in this Office Action that applicants have intended to recite "'a group consisting of Br<sub>2</sub>, nitric acid, hydrofluoric acid and acetic acid", or a group consisting of I<sub>2</sub>, nitric acid, hydrofluoric acid, and acetic acid". Also, in line 2 of the claim, the terms "light emitting diode dice" are not vague. The examiner assumes that applicants have intended to mean "light emitting diode". Appropriate correction is required.

### ***Specification***

3. The disclosure is objected to because of the following informalities: The specification fail to clearly describe that the etching solution is selected from a group consisting of "Br<sub>2</sub>, nitric

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acid, hydrofluoric acid and acetic acid and I2, nitric acid, hydrofluoric acid, and acetic acid”.

The examiner assumes in this Office Action that applicants have intended to recite “a group consisting of Br2, nitric acid, hydrofluoric acid and acetic acid, or a group consisting of I2, nitric acid, hydrofluoric acid, and acetic acid” in claim 11. Also, the specification fails to describe in exact terms “light emitting diode dice” in line 2. The examiner assumes that applicants have intended to mean “light emitting diode”.

Appropriate correction is required.

***Claim Rejections - 35 USC § 103***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
  2. Ascertaining the differences between the prior art and the claims at issue.
  3. Resolving the level of ordinary skill in the pertinent art.
  4. Considering objective evidence present in the application indicating obviousness or nonobviousness.
3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

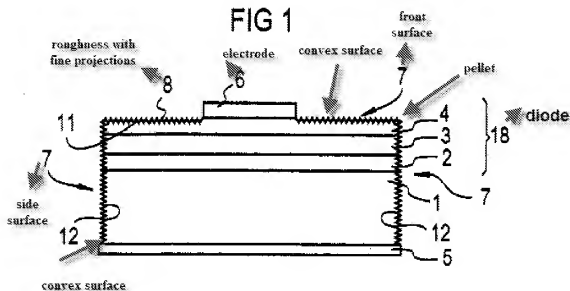
4. Claim 7 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wegleiter et al. (6,531,405; hereinafter as Wegleiter).

Wegleiter (6,531,405) discloses a light emitting diode 18 (fig. 1) comprising a pellet (fig. 1, see mark-up figure 1 below), a major front surface 7 (fig. 1) which is made of a GaAsP (col. 5, lines 18-28) mixed crystal, and where an electrode 6 (fig. 1) is formed; and characterized in that the major front surface 7 is a rough surface (fig. 1). That all side surfaces (fig. 1) of the pellet are roughened, wherein the rough surfaces are formed with fine projections with convex surfaces (fig. 1), wherein the fine projections are being formed densely by wet-etching (col. 2, lines 25-30) of an aqueous solution containing hydrofluoric acid, and that the convex surfaces of the rough surfaces are configured to allow a light getting to an interface (col. 4, lines 1-7) between a light emitting surface and the air at a general angle. Note that the rough surfaces of the pellet allow more light to be transmitted in the air, because the rough surfaces increase the surfaces area of the pellet. (See col. 4, lines 1-6). The convex surfaces have a general diameter. However, Wegleiter does not explicitly teach a specific range of the diameter which is defined as being a length from a starting point of one of the fine projection to the ending point of the one of the fine projection, as claimed. Nonetheless, the convex surfaces structure of Wegleiter has a general diameter length. Accordingly, it would have been obvious to one of ordinary skill in the art to use the convex surfaces having a general diameter of Wegleiter in the range as claimed, because it has been held that where the general conditions of the claims are disclosed in the prior

art, it is not inventive to discover the optimum or workable range by routine experimentation.

See In re Aller, 220 F.2d 454, 105 USPQ 233,235 (CCPA 1955).

Regarding to the last limitation of claim 7, a phrase “wherein the convex surfaces of the rough surfaces are configured to allow light getting to an interface between a light emitting surface and the air at an angle larger than a critical angle of total reflection to be transited into the air through the convex surfaces” does not further limit the structure of the device, because the phrase only recites a desired, functional result. Note, it has been held that a recitation with respect to the manner in which a claimed device is intended to be employed does not differentiate the claimed device from a prior art device satisfying the claimed structural limitations. Ex Parte Masham, 2 USPQ F. 2d 1647 (1987).



5. Claims 11 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wegleiter in view of Itabashi et al. (5,308,996; hereinafter as Itabashi)

Wegleiter (6,531,405) discloses a method of forming a light emitting diode 18 (fig. 1) comprising forming a pellet (fig. 1, see mark-up figure 1 below), a major front surface 7 (layer 4) (fig. 1) which is made of a GaAsP (col. 5, lines 18-28) mixed crystal, where an electrode 6 (fig. 1) is formed; wet-etching (col. 2, lines 25-30) the pellet with an etching solution of an aqueous solution containing hydrofluoric acid and characterized in that the major front surface 7 is a rough surface (fig. 1). That all side surfaces (fig. 1) of the pellet are roughened, wherein the rough surfaces are formed with fine projections with convex surfaces (fig. 1), wherein the fine projections are formed densely on all side surface of the pellet (fig. 1), wherein the fine projection have a general diameter. (See mark-up figure 1 below). However, Wegleiter does not explicitly teach a specific range of the diameter which is defined as being a length from a starting point of one of the fine projection to the ending point of the one of the fine projection, as claimed. Nonetheless, the convex surfaces structure of Wegleiter has a general diameter length. Accordingly, it would have been obvious to one of ordinary skill in the art to use the convex surfaces having a general diameter of Wegleiter in the range as claimed, because it has been held that where the general conditions of the claims are disclosed in the prior art, it is not inventive to discover the optimum or workable range by routine experimentation. See In re Aller, 220 F.2d 454, 105 USPQ 233,235 (CCPA 1955).

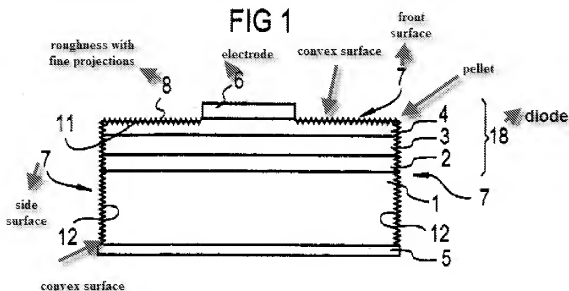
Regarding to the etching solution, although Wegleiter does not explicitly teach the etching solution selected from a group consisting of Br<sub>2</sub>, nitric acid, hydrofluoric acid and acetic acid, or a group consisting of I<sub>2</sub>, nitric acid, hydrofluoric acid, and acetic acid.

Itabashi discloses an analogous method having the step of etching a layer surface of the device using an aqueous etching solution containing iodine (I<sub>2</sub>), nitric acid, hydrofluoric acid

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and acetic acid (col. 9, lines 36-41) for reducing the time of making the device (col. 3, lines 25-26).

Therefore, as to claim 11, it would have been obvious to one skilled in the art at the time the invention was made to modify the aqueous etching solution of Wegleiter with the aqueous etching solution having I<sub>2</sub>, nitric acid, acetic acid, and hydrofluoric acid, as taught by Itabashi, for the advantage as mentioned in the above.



With respect to claim 13, the combined teaching of Wegleiter and Itabashi meets the present invention, except specifying the concentration molar ratio ranges of the nitric acid, hydrofluoric acid, acetic acid, and I<sub>2</sub> as claimed. However, it is common in the semiconductor art to vary the concentration molar ratio of the chemical compounds in an etching solution. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was

made to modify the combined teaching of Wegleiter and Itabashi with specific ranges of the chemical compounds concentration in the etching solution, since it is prima facie obvious to an artisan for routine experimentation and optimization to set the specific ranges of the chemical compounds concentration because applicants have not yet established any criticality or unexpected result for the concentration ranges.

Note: Normally, it is to be expected that a change in temperature, thickness, chemical concentration, or in time, would be an unpatentable modification. Under some circumstances, however, changes such as these may impart patentability to a process if the particular ranges claimed produce a new and unexpected result which is different in kind and not merely degree from the results of the prior art...such ranges are termed "critical ranges and the applicant has the burden of proving such criticality.... More particularly, where the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." In re Aller 105 USPQ233, 255 (CCPA 19553). Furthermore, the specification contains no disclosure of either the critical nature of the claimed concentration ranges of any unexpected results arising therefrom. Where patentability is aid to be based upon particular chosen concentration ranges or upon another variable recited in a claim, the applicant must show that the chosen concentration ranges are critical. (In re Woodruff, 919 F.2d 1575, 1578 (Fed. Cir. 1990).)

### ***Response to Arguments***

6. Applicant's arguments with respect to the pending claims have been considered but they are not persuasive.

a. Rejection of claim 7: Newly amended claim 7 fails to overcome Wegleiter reference. As stated in the rejection above, the amended portion, “the diameter is a length from a foot of one of the fine projections to a foot of next one of the fine projections, i.e., width of the fine projection is in a range of 0.3um to less than 3um” (page 5, second paragraph) does not overcome Wegleiter. The defined length of the diameter and the specific range for the diameter do not bring forth any criticality or unexpected result to the device. It is noted in the rejection that Wegleiter’s convex surfaces have a general diameter. Thus, it would have been obvious to one of the ordinary skill in the art at the time the invention was made to modify the diameter of Wegleiter with the specific range as claimed to find an optimum or workable range by routine experimentation. (See above rejection) Further, applicants allege that Wegleiter fails to teach or suggest “the convex surfaces of the rough surfaces are configured to allow a light getting to an interface between a light emitting surface and the air at an angle larger than a critical angle of total reflection  $\theta_c$  to be transited into the air through the convex surfaces” (page 5, second paragraph). The examiner respectfully disagrees. The asserted limitation does not further limit the structure of the device, because the asserted limitation only recites a desired, functional result. It has been held that a recitation with respect to the manner in which a claimed device is intended to be employed does not differentiate the claimed device from a prior art device satisfying the claimed structural limitations. *Ex Parte Masham*, 2 USPQ F. 2d 1647 (1987). Therefore, claim 7 is still rejected.

b. Rejection of claim 11: The newly amended claim 11 fails to overcome the combined teaching of Wegleiter and Itabashi. Wegleiter discloses the invention substantially as claimed, except among other the etching solution is selected from a group consisting of Br<sub>2</sub>, nitric acid, hydrofluoric acid and acetic acid, or a group consisting of I<sub>2</sub>, nitric acid, hydrofluoric acid, and acetic acid. Itabashi cures the deficiency in Wegleiter, because Itabashi discloses an etching solution selected from a group consisting of I<sub>2</sub>, nitric acid, hydrofluoric acid, and acetic acid. It is noted that Itabashi 's etching solution has the same chemical compounds as applicants' etching solution, thereby producing the same result for the rough surfaces. Thus, it would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute Wegleiter's etching solution with the etching solution having I<sub>2</sub>, nitric acid, hydrofluoric acid, and acetic acid, as taught by Itabashi, for achieving a faster result. (See above rejection).

c. Claim 13 depends on claim 11 which is also rejected.

### **Conclusion**

7. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after

the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to (Vikki) Hoa B. Trinh whose telephone number is (571) 272-1719. The Examiner can normally be reached from Monday-Friday, 9:00 AM - 5:30 PM Eastern Time. If attempts to reach the examiner by telephone are unsuccessful, the Examiner's supervisor, Ms. Davienne Monbleau, can be reached at (571) 272-1945. The office fax number is 571-273-8300.

Any request for information regarding to the **status** of an application may be obtained from the **Patent Application Information Retrieval (PAIR) system**. Also, status information for published applications may be obtained from either Private PAIR or Public Pair. In addition, status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. If you have questions pertaining to the Private PAIR system, please contact the Electronic Business Center (EBC) at 866-217-9197 (toll free).

Lastly, paper copies of cited U.S. patents and U.S. patent application publications have ceased to be mailed to applicants with Office actions since June 2004. Paper copies of foreign patents and non-patent literature will continue to be included with office actions. These cited U.S. patents and patent application publications are available for download via the Office's

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PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site ([www.uspto.gov](http://www.uspto.gov)), from the Office of Public Records and from commercial sources. Applicants are referred to the Electronic Business Center (EBC) at <http://www.uspto.gov/ebc/index.html> or 1-866-217-9197 for information on this policy.

Requests to restart a period for response due to a missing U.S. patent or patent application publications will not be granted.

/(Vikki) Hoa B Trinh/

Examiner, Art Unit 2893